

THREE NEW SPECIES OF *SOLANUM* SECTION *GEMINATA* (G. DON) WALP. (SOLANACEAE) FROM PANAMA AND WESTERN COLOMBIA¹

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ABSTRACT

Three new species of *Solanum* are described: *S. darienense* from eastern Panama, *S. unifoliatum* from the low elevation wet forests of the department of Chocó in Colombia, and *S. dolosum* from higher elevations in the department of Valle de Cauca in Colombia. Relationships of these species are discussed.

Solanum section *Geminata* (G. Don) Walp. is one of the largest sections of *Solanum*, with 82 species, most of these Neotropical. They are generally small trees and shrubs, often growing in primary forest understory, an unusual habit in *Solanum*. Characters useful in recognizing the section are 1) difoliate sympodial units with geminate leaf clusters or unifoliate sympodial units, 2) leaf-opposed inflorescences, 3) plants glabrous or with simple uniseriate trichomes, 4) small white or greenish-white flowers, and 5) hard, green fruits at maturity (see Knapp, 1985, 1986 for discussion of these characters). While preparing a monograph of the group, I encountered many new species, both in the field and in the herbarium. Three of these are described here so that the names can be used in floristic works.

Solanum darienense S. Knapp, sp. nov. TYPE: Panama, Darién, Cana near Río Setigandí, 540–580 m, 18 Apr. 1980, Gentry et al. 28541 (holotype, MO, location of isotypes unknown). Figure 1.

Frutex; caules juniores sparse pubescentes, laete alati; *caules veteres* glabri, cortice nitido rubro-stramineo; *nodi* unifoliati; *folia* elliptica vel ovata utrinque glabra; apice acuto, basi truncata; *inflorescentiae* foliis oppositae simplices filiformes minute puberulae; *pedicelli* sub anthesi filiformes deflexi; *calycis lobi* deltoidei minute puberuli; *corolla* alba lobis sub anthesi reflexis; *bacca* globosa viridis, pedicello frugifero deflexo ad apicem expanso; *semina* fusca ovoidea reniformia, testa foveolata.

Shrubs with foetid foliage, 1–1.5 m tall; young

stems sparsely hispidulous with erect uniseriate trichomes ca. 0.1 mm long, these often only on one side of the stem; young leaves glabrous; stems winged from the decurrent leaf bases; bark of older stems reddish-golden and shiny. Leaves elliptic to ovate, not geminate except on non-reproductive nodes, widest at or just below the middle, glabrous on both surfaces, occasionally minutely puberulent along the veins beneath, 11–14 cm long, 3–4.5 cm wide, with 7–8 pairs of primary veins, these not prominently raised above, prominent and yellowish beneath, the apex acute to acuminate, the base truncate; petioles winged from the decurrent leaf bases, ca. 1 mm long. Inflorescences opposite the leaves, simple, thread-like, 0.5–1.5 cm long, 4–5-flowered, minutely puberulent with erect uniseriate trichomes like those of the stems; pedicel scars evenly spaced 1–2 mm apart, slightly raised; pedicels at anthesis filiform, 0.6–1 cm long, tapering from the calyx to a slender base ca. 0.25 mm in diameter, sparsely puberulent with uniseriate trichomes; buds globose when young, hispidulous with uniseriate trichomes like those of the rest of the inflorescence, the corolla soon exerted from the calyx tube making the buds elliptic to obovoid; calyx tube broadly conical, ca. 0.5 mm long, the lobes deltoid, 0.25–0.5 mm long, the margins paler, the lobes and tube minutely hispidulous with uniseriate trichomes ca. 0.1 mm long; corolla white, 5–7 mm in diameter, lobed nearly to the base, the lobes reflexed at anthesis, the tips and margins of the lobes minutely papillose; anthers ca. 1.5 mm long, 1 mm wide, poricidal at

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FIGURE 1. *Solanum darienense* (from Gentry et al. 28541), scale bar equals 1 cm.

the tips, the pores becoming slit-like upon drying; free portion of the filaments 0.25–0.3 mm long, the filament tube ca. 0.1 mm long; ovary glabrous; style straight, 3–3.5 mm long; stigma a slight broadening at the top of the style, minutely papillose. Berries globose, green at maturity, ca. 1.5 cm in diameter; fruiting pedicels deflexed, woody, 1.8–1.9 cm long, expanded at the apex, 0.5–0.75 mm in diameter at the base; seeds dark brown in dry material, ovoid-reniform, 3–3.5 mm long, 2–2.5 mm wide, the surfaces minutely pitted. Chromosome number: not known.

Distribution. In the low mountains of eastern Panama, the only collections are from the vicinity of the gold mine at Cana, from 500 to 600 m elevation. Figure 2.

Solanum darienense is related to *S. confine* Dunal in DC., a species of the Andean foothills in eastern Peru, and to *S. pertenue* Morton &

Standley of montane Costa Rica and western Panama. *Solanum darienense* is distinct from these two species in its reddish-golden bark, slightly winged stems, obtuse, slightly oblique leaf bases and generally glabrous leaves. The members of this species complex are all very similar, perhaps due to their primary forest habitat. D'Arcy (1973) recognized *S. darienense* as a new entity from Panama but, due to the paucity of material available at the time, did not describe it. The species may also occur in adjacent Colombia or in other parts of the range of low mountains on the Panama-Colombia border.

Additional specimens examined. PANAMA. DARIEN. Vicinity of airstrip at Cana gold mine, 480 m, 29 Jul. 1976, Croat 37963 (MO); vicinity of Cana, 1,750 ft, 23 Jun. 1959, Stern et al. 477, 661 (MO, US).

***Solanum unifoliatum* S. Knapp, sp. nov.** TYPE: Colombia, Chocó, Municipio de Chocó,

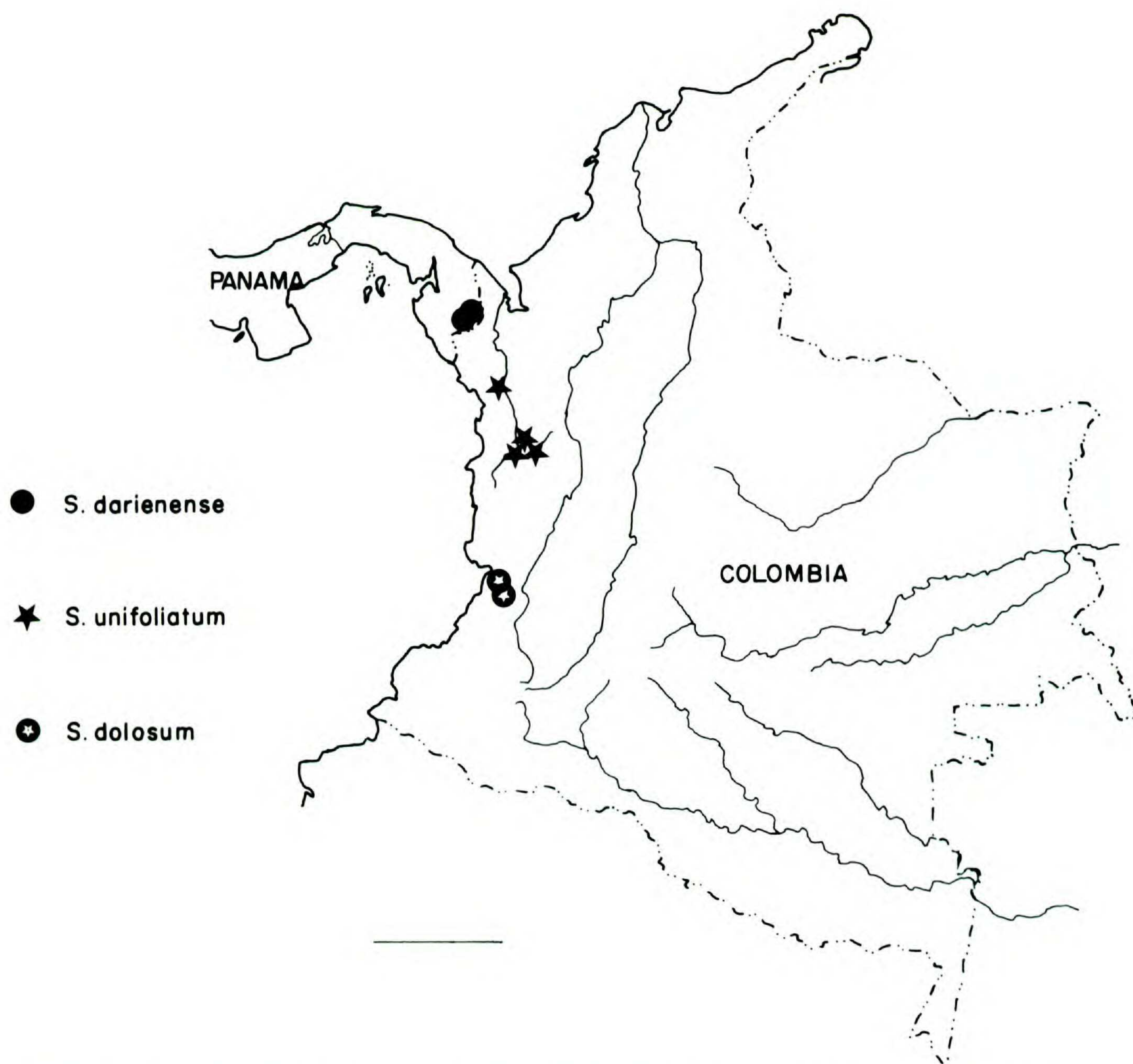


FIGURE 2. Distribution of *S. darienense*, *S. unifoliatum*, and *S. dolosum*, scale bar equals 200 km.

Carretera Quibdó-Tutenendo 15 km de Quibdó, 45 m, 6 Sep. 1976, *Forero & Jaramillo* 2544 (holotype, MO, isotype, COL, not seen). Figure 3.

Frutex; *caules* glabri laete alati, cortice viridi-fusco; *nodi* unifoliati; *folia* elliptica vel anguste elliptica utrinque glabra, apice longe acuminato, basi attenuata, marginibus revolutis undulatis; *inflorescentiae* foliis oppositae simplices, cicatricibus pedicelli arcte et aequaliter dispositis; *pedicelli* sub anthesi deflexi filiformes; *calycis lobi* irregulariter rotundati; *corolla* minuta pallide viridis, lobis sub anthesi reflexis; *bacca* globosa viridis, pedicello frugifero erecto vel deflexo.

Shrubs or subshrubs, 1–3 m tall; stems glabrous, lightly winged between the nodes with the decurrent leaf bases; bark light greenish brown, sparsely lenticellate, in age becoming paler and

exfoliating. Sympodial units unifoliate. Leaves elliptic to narrowly elliptic, not geminate, widest at the middle, glabrous on both surfaces, 18.8–27.5 cm long, 4.8–7.3 cm wide, with 5–6 pairs of primary veins, only the midrib raised above, prominent below, the apex long acuminate, the base attenuate, winged onto the petiole and the stem; margins revolute and slightly undulate, occasionally somewhat erose; petioles 2–2.6 cm long, winged from the decurrent leaf bases. Inflorescences opposite the leaves, simple, 0.6–3 cm long, 20–100-flowered, sparsely papillose distally; pedicel scars closely and evenly packed, but not overlapping; pedicels at anthesis 5–6 mm long, deflexed, filiform, less than 0.25 mm in diameter at the base, abruptly widening to the calyx tube; buds globose, translucent, minutely



FIGURE 3. *Solanum unifoliatum* (from Forero & Jaramillo 2808 & Gentry & Fallen 17585), scale bar equals 1 cm.

papillose; calyx tube ca. 0.5 mm long, cup-shaped, the lobes rounded and irregular, ca. 0.5 mm long, minutely papillose; corolla minute, pale green, ca. 5 mm in diameter, lobed three-quarters of the way to the base, the lobes reflexed at anthesis, the tips and margins of the lobes minutely papillose; anthers ca. 1.5 mm long, 0.5 mm wide, poricidal at the tips, the pores becoming slit-like

upon drying; free portion of the filaments less than 0.1 mm long, the filament tube less than 0.1 mm long; ovary glabrous; style straight, ca. 2.5 mm long, in short styled flowers ca. 0.5 mm long; stigma clavate, dark papillose at the tip. Berries globose, slightly umbonate when immature, green at maturity, 0.8–1 cm in diameter; fruiting pedicels erect or somewhat deflexed,

woody, 1.8–2 cm long, 0.5–1 mm in diameter at the base; immature seeds flattened-reniform, ca. 2 mm long, 2 mm wide, the surfaces minutely pitted. Chromosome number: not known.

Distribution. Found only in the pluvial forest in the department of Chocó in Colombia, near sea level. All known collections are from the upper Rio Atrato basin. Apparently a plant of both primary and secondary forest. Figure 2.

Solanum unifoliatum is very closely related to *S. triplinervium* Morton, also of the Chocó floristic province but known only from Isla Gorgona off the department of Nariño. The two species share unifoliate nodes, unusual in the section, crowded inflorescences with closely packed pedicel scars, and large glabrous leaves. *Solanum unifoliatum* differs from *S. triplinervium* in its longer inflorescences and leaf venation. *Solanum triplinervium*, as the name suggests, has three main veins from the leaf base, and the strongly parallel tertiary venation is very like that of a member of the Melastomaceae (Morton, 1944). *Solanum unifoliatum* has leaf venation like other members of the Solanaceae.

Only two flowers are present on the type specimen, and one of these is apparently short-styled. Andromonoecy has not been demonstrated in section *Geminata*, but this is one of the many species with short and long-styled flowers. The large numbers of fruit set on each inflorescence of *S. unifoliatum* seems to indicate that the species is not andromonoecious (see Whalen & Costich, 1986), but further work is clearly needed.

Additional specimens examined. COLOMBIA. CHOCÓ. Quibdo, Guayabal, Rio Hugon, ca. 80 m, 12 Sep. 1976, Forero & Jaramillo 2808 (MO); 7 km W of Tutenendo on road to Quibdo, ca. 100 m, 12 Aug. 1976, Gentry & Fallen 17585 (MO); 11 km S of Quibdó on road to Yuto, ca. 50 m, 7 Jan. 1979, Gentry & Renteria A. 23726 (MO); road from Lloro to Yuto, ca. 2 km E of Yuto, ca. 50 m, 18 Jan. 1979, Gentry & Renteria A. 24410 (MO, NY).

***Solanum dolosum* Morton ex S. Knapp, sp. nov.**

TYPE: Colombia, Valle de Cauca, Cordillera Occidental, La Cumbre, 1,600–1,800 m, 14–19 May 1922, Killip 5705 (holotype, US, isotype, NY). The sheet at US bears an annotation label in Morton's handwriting dated Nov. 1935 stating "*Solanum dolosum* Morton TYPE", but a description was never provided for this species. This sheet is therefore designated as the holotype. Figure 4.

Frutex; caules juniores pubescentes valde alati; nodi unifoliati; folia lanceolata vel linearia supra glabra subtus secus nervos puberula, apice longe acuminato, basi cuneata, marginibus erosio ad apicem ciliatis; inflorescentiae foliis oppositae vel internodaliae simplices pubescentes; pedicelli sub anthesi deflexi; calycis lobi deltoidei in alabastro carnosii; corolla alba, lobis longe acuminatis sub anthesi reflexis; bacca et semina ignotae.

Shrubs or climbing shrubs, of unknown height; young stems and leaves hirsute with uniseriate golden trichomes ca. 0.1 mm long; the ultimate branchlets slender; bark of the older stems partially glabrate, golden green; stems strongly winged from the decurrent leaf bases, and also from *de novo* wings arising ca. 1 mm below the inflorescence. Sympodial units unifoliate. Leaves lanceolate to linear, not geminate, widest just below the middle, 5.5–11.2 cm long, 1.4–1.7 cm wide, with 6–10 pairs of primary veins, these indistinct above except for the raised midrib, prominent, yellowish, and puberulent with uniseriate trichomes 0.05–0.1 mm long, the apex long acuminate, the extreme tip blunt and rounded, the base cuneate, decurrent on the petiole and stem; the leaf margins erose, ciliate near the apex; petioles winged, 1–5 mm long. Inflorescences opposite the leaves or occasionally internodal, filiform, simple, 0.5–1.2 cm long, 2–6-flowered, densely to sparsely hirsute with uniseriate golden trichomes like those of the young leaves and stems; pedicel scars irregularly spaced 0.5–2 mm apart, beginning 2–3 mm from the base of the inflorescence; pedicels at anthesis 4–6 mm long, deflexed, tapering from the calyx tube to a slender base ca. 0.5 mm in diameter, sparsely pubescent with uniseriate trichomes; buds globose, the calyx lobes swollen and knob-like; calyx tube ca. 1 mm long, sparsely pubescent, the lobes broadly deltoid, 0.5–1 mm long, sparsely pubescent with the same golden uniseriate trichomes as the rest of the inflorescence, minutely papillose at the tips; corolla white, 8–9 mm in diameter, lobes three-quarters of the way to the base, the lobes long acuminate, reflexed at anthesis, minutely papillose on the tips and margins; anthers 1.5–2 mm long, the terminal ca. 0.2 mm thickened and paler, 1–1.5 mm wide, poricidal at the tip, the pores becoming slit-like upon drying; free portion of the filaments 0.5–1 mm long, the filament tube ca. 1 mm long; ovary glabrous; style straight, ca. 4 mm long; stigma not distinguishable from the rest of the style, minutely papillose on the extreme tip. Ber-



FIGURE 4. *Solanum dolosum* (from Killip 5705, 11589), scale bar equals 1 cm.

ries globose, glabrous, only immature ones seen. Chromosome number: not known.

Distribution. On the western slopes of the Cordillera Occidental in the department of Valle

de Cauca in Colombia, from 1,200 to 2,000 m in elevation. Figure 2.

Solanum dolosum is most closely related to an undescribed species from high elevation eastern

Bolivia. It shares with that species leaves that are ciliate at the apex, filiform inflorescences, and zig-zag stems. The inflorescences of *S. dolosum* are much shorter, ca. 1 cm as opposed to 3–5 cm, and the leaves are acute at the base. *Solanum dolosum* is also quite similar to *S. longevirgatum* Bitter, also found on the western slope of the Cordillera Occidental, but from higher elevations in the department of Cauca. *Solanum dolosum* is distinct from *S. longevirgatum* in its lanceolate to linear leaves that are ciliate at the apex, shorter pubescence, and much smaller (8–9 mm in diameter versus 1–2 cm in diameter) flowers. The two species share unifoliate nodes, fleshy calyx lobes in bud, prominent yellow leaf venation, and erose leaf margins.

Additional specimens examined. COLOMBIA. VALLE DE CAUCA. Cordillera Occidental, W slope, Rio Digua, right bank between Queremal & La Elsa, 1,160–1,200

m, 27, 29 Mar. 1947, Cuatrecasas 23897 (US); La Cumbre, Cordillera Occidental, 1,600–2,100 m, 25–27 Sep. 1922, Killip 11589 (NY, US).

LITERATURE CITED

- D'ARCY, W. G. 1973. Solanaceae. In R. E. Woodson & R. W. Schery (editors), *Flora of Panama*. Ann. Missouri Bot. Garden 60: 573–780.
- KNAPP, S. 1985. New species of *Solanum* section *Geminata* (G. Don) Walp. (Solanaceae) from South and Central America. Ann. Missouri Bot. Garden 72: 558–569.
- . 1986. A Revision of *Solanum* Section *Geminata* (G. Don) Walpers. Ph.D. Thesis. Cornell University, Ithaca, New York. 640 pp.
- MORTON, C. V. 1944. Some South American species of *Solanum*. Contr. U.S. Natl. Herb. 29: 41–72.
- WHALEN, M. D. & D. E. COSTICH. 1986. Andromonoecy in *Solanum*. In W. G. D'Arcy (editor), *Solanaceae: Systematics and Biology*. Columbia University Press, New York.